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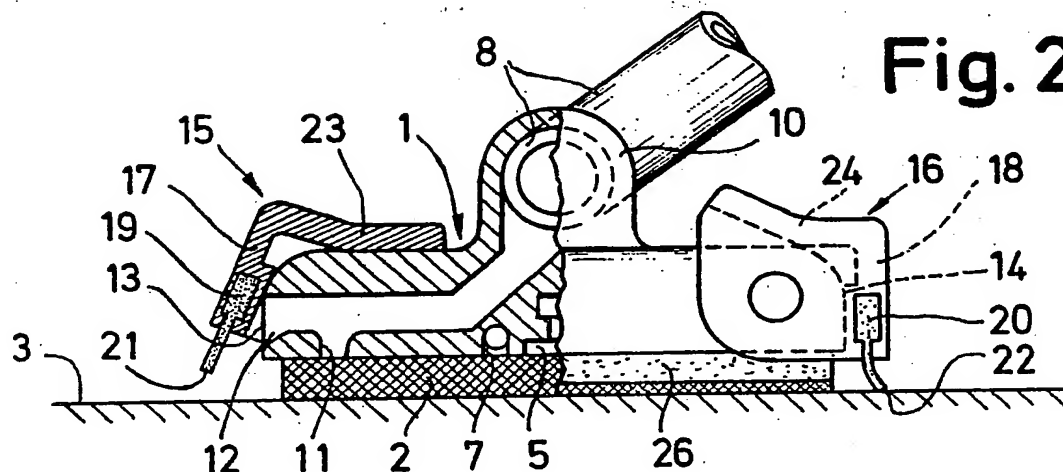
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(54) Cleaning heads for cleaning flat surfaces

(57) A cleaning head 1 for cleaning a flat surface 3 comprises an air-and-liquid permeable cleaning pad 2 with spray nozzles 5 for supplying cleaning liquid to one region of the pad and suction opening 11 for removing cleaning liquid from another region of the pad offset in the pushing direction. Squeegees 19, 20 are provided at the front and rear edges of the head for scraping the surface at the rear of the head in the pushing direction so as to remove liquid from the surface.



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Fig. 1

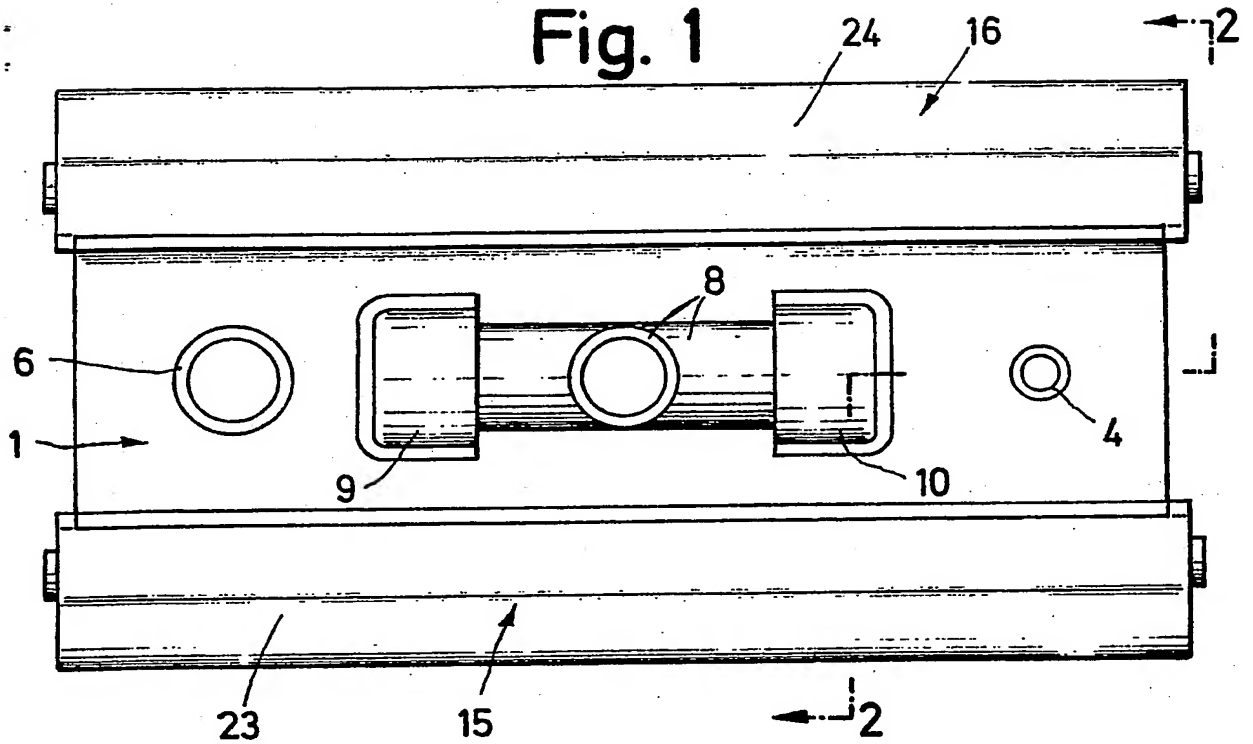


Fig. 2

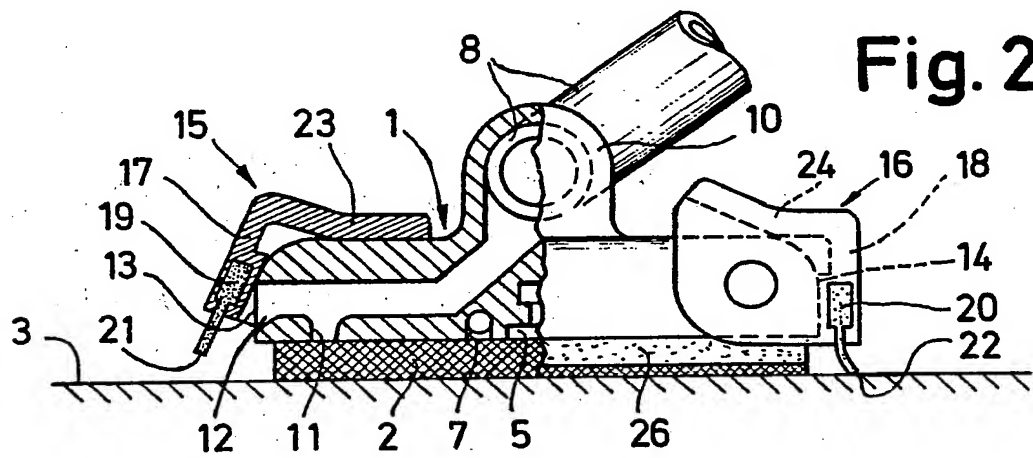
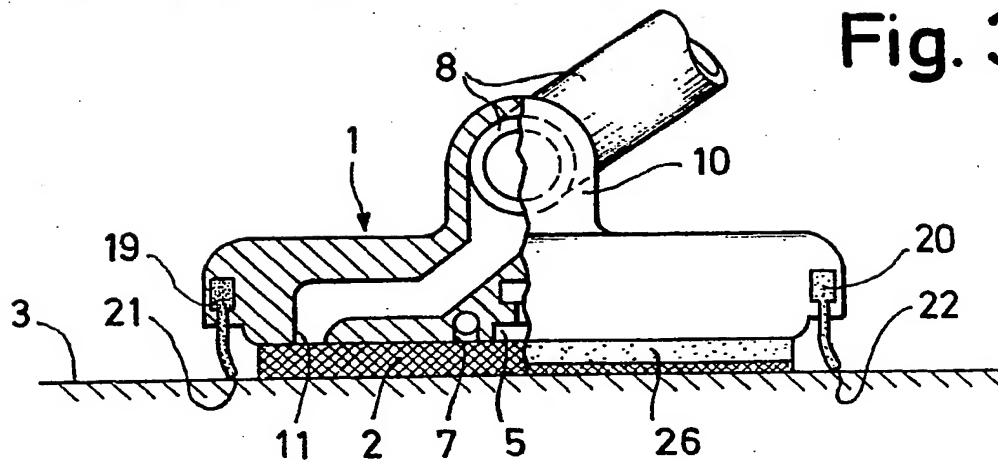


Fig. 3



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Fig. 4

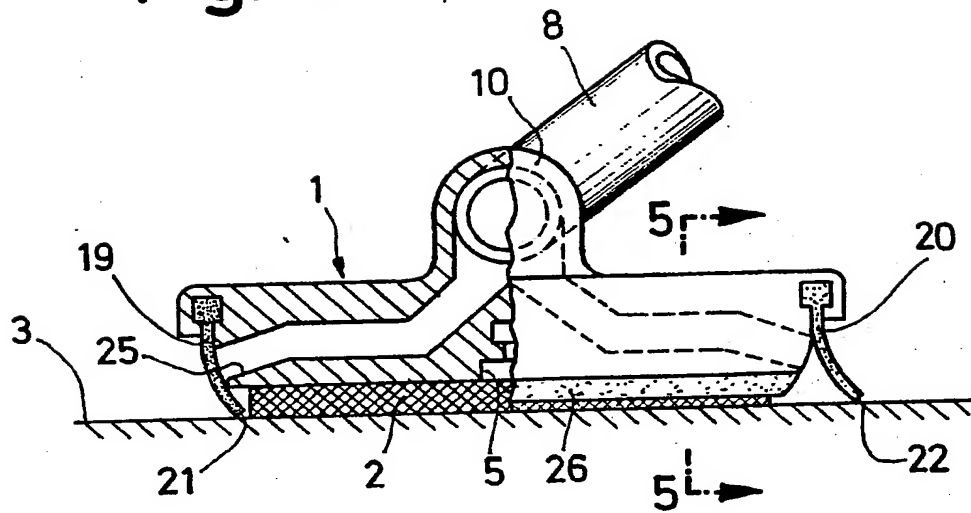
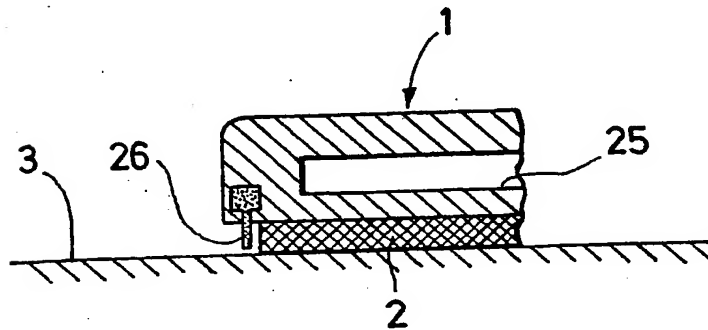


Fig. 5



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Fig. 6

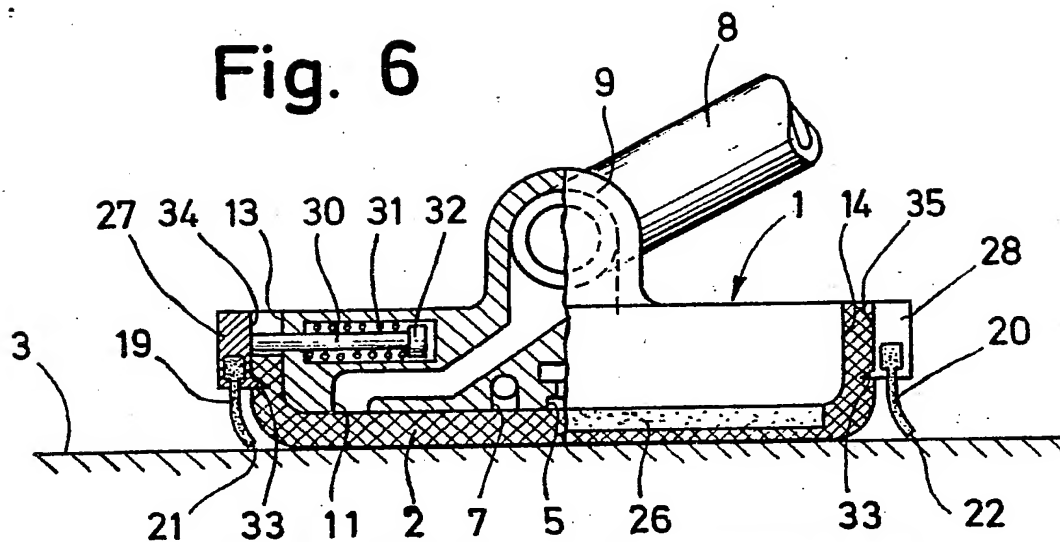
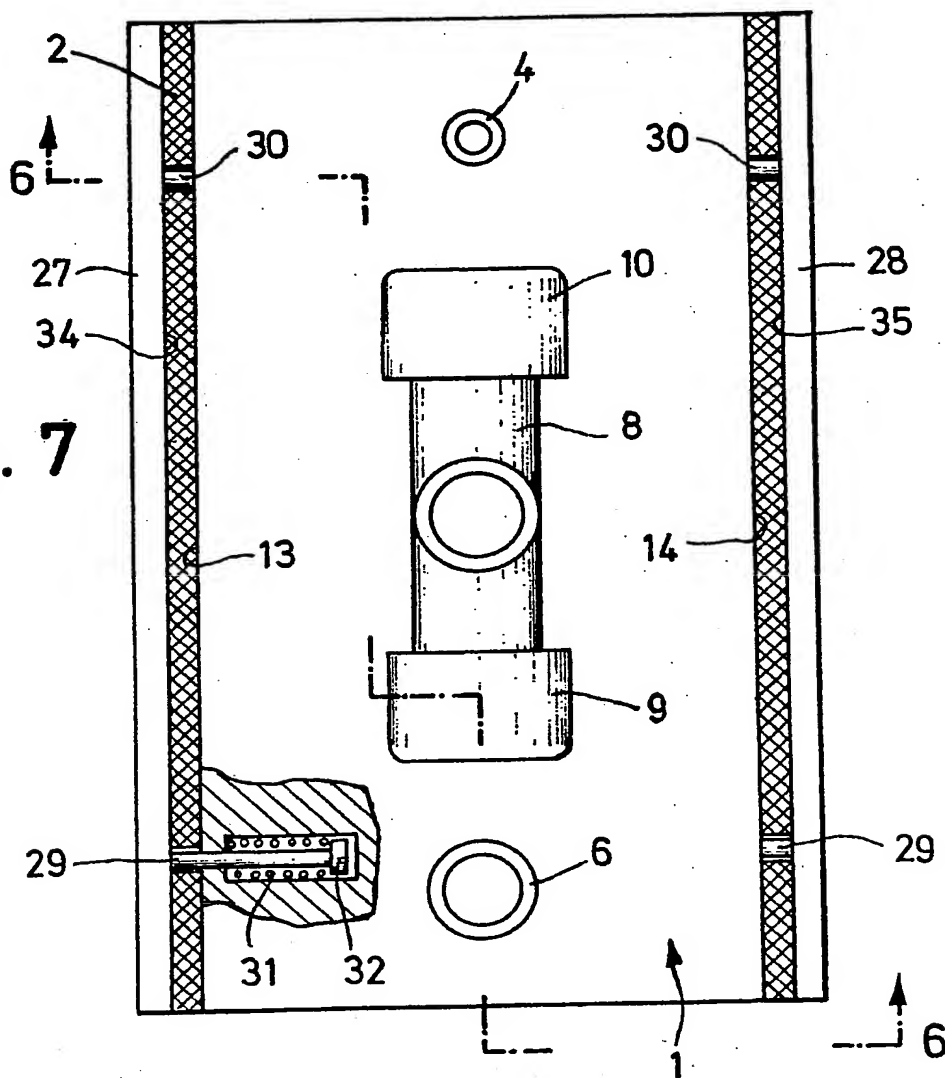


Fig. 7



## SPECIFICATION

## Improvements in or relating to cleaning heads for cleaning flat surfaces

- 5 The invention relates to a cleaning head for cleaning flat surfaces, the cleaning head being of the type comprising an air- and liquid-permeable cleaning pad covering the head on its working face, spray
- 10 nozzles for feeding a cleaning liquid into a first region of the pad, and at least one extractor for removing the cleaning liquid from another region of the pad offset with respect to the first region in the pushing direction.
- 15 Such cleaning heads are known for example from DE-OS 26 28 450 and DE-OS 26 40 924. In such cleaning heads the cleaning liquid is sprayed into a pad in a first region as a result of which the cleaning pad is continuously cleaned. The pad, for example a non-
- 20 woven fabric cloth, cleans the flat surface both mechanically as well as by the application of the liquid; the dirty liquid is then extracted again in an adjacent extraction zone.
- However, a disadvantage of such cleaning heads
- 25 is that the cleaned surface is left wet. A wet surface cannot be walked on due to the risk of dirtying it again. There is also an increased danger of accident on such surfaces.
- According to the invention, there is provided a
- 30 cleaning head for cleaning a flat surface comprising an air- and liquid-permeable cleaning pad covering the head on a working face of the head, spray nozzles for feeding a cleaning liquid into a first region of the pad, and at least one extractor for removing the
- 35 cleaning liquid from another region of the pad offset with respect to the first region in a pushing direction of the head, at least the rear transverse edge of the head in the pushing direction being provided with a generally vertically disposed squeegee made of a
- 40 flexible material, a free edge of the squeegee being arranged to rest on the surface to be cleaned.
- It is thus possible to provide a cleaning head whose use results in the cleaned surface being left substantially dry after cleaning.
- 45 The squeegee can wipe off the film of liquid remaining on the flat surface after extraction with the result that a dry surface is left.
- Preferably the vertical length or height of the or each squeegee is slightly greater than the distance
- 50 between its mounting on the head and the surface with the result that it is inclined in the region of the surface when the head is pushed forward. This makes it possible for the or each squeegee to contact the surface with a sharp edge and to wipe off the
- 55 liquid.
- Preferably, both the front and rear edges of the head are provided with such a squeegee lip. The liquid can then be efficiently removed from the surface in the case of double-sided operation. With this
- 60 design it is advantageous if the squeegee has vertical longitudinal ribs on its side facing away from the head so that, when the head is pushed forward, the

front squeegee is not in flat contact with the surface, but is kept at a distance from the surface by the ribs. This permits a considerable reduction in the friction when the head is pushed. Furthermore, this prevents dirt from being pushed away.

65 Preferably, the head is provided with an extractor in the region of the squeegees on their sides facing the head, the extractor preferably joining into the region of the pad adjacent to each squeegee.

70 Preferably, the or each squeegee is fastened to a holder swivel-mounted on the head, the holder being able to swivel between a first position in which the squeegee is in contact with the surface and a

75 second position in which the squeegee is away from the surface. In this way it is possible to bring the squeegee into and out of engagement with the surface as desired.

80 Preferably there emerges on the end face of the head an extractor which is closed by the holder when in the first position and is open when the latter is in its second, raised position. In the open position any dirt on the surface goes under the raised squeegee

85 directly into the extractor line, i.e. a dirt extractor comes before the cleaning head. When the holder is in the lowered position, the extractor is inoperative since the suction openings are closed.

Preferably, extractors emerge at both end faces of

90 the head and the flexible squeegees are disposed above the outlet openings in such a way that, on the front side of the head when pushing forward, they are bent in front of the outlet openings so that they are sucked onto the latter thereby closing them,

95 whereas, at the rear side of the head, they are bent away from the intake openings thereby opening the latter.

This leads to an automatic switchover of the extractors, i.e. the extractor on the front side is

100 inoperative while the rear extractor can develop its full effect and extract the liquid which has been wiped from the surface.

The two longitudinal or side edges of the head may be provided with a cover for the longitudinal

105 edges of the pad, the free ends of which covers terminate at a slight distance from the surface. Such a cover can prevent the taking in of secondary air through the longitudinal or side edges of the pad. The covers may, for example, be strips of flexible

110 material mounted on the head and projecting vertically downwards or may be downward-projecting bristles. Nevertheless, the forward movement of the head is not hindered by these covers since they do not touch the surface.

115 Preferably, the squeegees are fastened to holding strips which are mounted on the front side and back side of the head and can be moved parallel to the pushing direction, the holding strips being pressed against the head by spring means whereby the front

120 and rear edges of the pad are clamped in the gap between the holding strips and the head. It is of advantage if the sides of the holding strips facing the pad are provided with pointed locating lugs which hold the pad particularly firmly, in its clamped posi-

tion.

The invention will be further described, by way of example, with reference to the accompanying drawings, in which:

5 Figure 1 is a top view of a cleaning head constituting a first embodiment of the invention;

Figure 2 is a sectional view along line 2-2 in Figure 1;

10 Figure 3 is a view similar to Figure 2 of a cleaning head constituting another preferred embodiment of the invention;

Figure 4 is a view similar to Figure 2 of a cleaning head constituting a further preferred embodiment of the invention;

15 Figure 5 is a sectional view along line 5-5 in Figure 4;

Figure 6 is a view similar to Figure 2 of a cleaning head constituting yet a further preferred embodiment of the invention; and

20 Figure 7 is a sectional view along line 6-6 in Figure 7.

The cleaning head shown in Figures 1 and 2 and constituting a first embodiment of the invention has a housing 1 on the underside of which there is an air- and liquid-permeable pad 2 covering almost the entire underside of the housing. The pad 2 rests on a surface 3 being cleaned. The pad 2 may, for example, be of needle felt or may be a nonwoven fabric mat.

30 On the top side of the housing 1 there is a first connection nozzle 4 for the supply of spray liquid. This connection nozzle 4 is, in a manner not evident from the drawing, connected to liquid-delivery openings 5 on the underside of the housing. The liquid can be sprayed into the pad in the central region of the cleaning head via these liquid-delivery openings.

35 A further connection nozzle 6 on the top side of the housing is connected to air outlet openings 7 on the underside of the housing 1. The air outlet openings 7 are disposed in front of and behind the liquid-delivery openings 5. The connection nozzle 6 may be of adjustable design so that it is possible to control the quantity of air entering the pad through the air outlet openings 7 from this connection nozzle.

40 A T-shaped pipe-piece 8 of a suction line is mounted on the top side of the housing 1 and is rotatable about a horizontal axis running transverse to the pushing direction, whereby the ends of the pipe-piece 8 are covered by hood-like bearing and connection parts 9 and 10. The inside of the connection parts 9 and 10 is connected to suction openings 11 which emerge into the pad 2 on the underside of the housing in the vicinity of the front and rear edges of the pad 2. Furthermore, suction openings 12 connected to the suction line are provided at the front and rear end faces 13 and 14 of the housing 1.

45 Hood-like holders 15 and 16 of essentially L-shaped cross-section are mounted at the front and rear edges of the housing and are arranged to swivel about horizontal axes running transverse to the pushing direction. The holders 15 and 16 bear on their vertical legs 17 and 18 downwardly-projecting squeegees 19 and 20 which are made of a flexible material insensitive to the spray liquid and having sharp wiping edges 21 and 22 at their free ends.

The holders 15 and 16 can be swivelled between a first position in which the squeegee 19 fastened to the holder rests on the surface 3 (right-hand side in Figure 2) and a second position in which the squeegee is away from the surface (left-hand side in Figure 2) whereby, in the first position, the inside of the holder is in contact with the end face of the housing and closes the suction opening 12, while, in the second position, it opens the suction opening 12.

70 Horizontal limbs 23 and 24 of the holders 15 and 16 are slightly inclined at their free ends so that with the holder in the raised position this region comes up against the top side of the housing and limits the swivel movement of the holder (Figure 2).

80 The holder can be fixed both in the first, bottom position as well as in the second, top position in known manner, for example by means of a catch.

As shown in Figure 2, each squeegee projects so far from its holder that it is bent back slightly when the cleaning head is placed on the surface 3.

85 When the described cleaning head is in operation, it is, for example, first of all pushed from right to left as shown in Figure 2. The holder 15 at the front is in the raised position in the manner evident from the drawing, with the result that the squeegee 19 is away from the surface 3 and the suction opening 12 extending over the entire width of the housing is open. When pushing forward, therefore, any dirt in front of the cleaning head is extracted via the suction opening 12.

95 Simultaneously, spray liquid is forced into the pad 2 via the liquid-delivery opening 5 which may, for example, be formed by a row of spray nozzles extending over the entire width of the head. The spray liquid cleans the pad 2 in the area where it enters and simultaneously moves through the pad onto the surface being cleaned and dissolves any dirt on the surface. The distribution of the spray liquid in the pad is promoted by the suction openings 11 which draw in liquid on either side of the central liquid-delivery opening 5. The degree to which the liquid is drawn in can be set by metering the air flow which can flow into the pad through the air outlet opening 7. When the head is pushed forward, the pad cleans the flat surface whereby the dirt taken up by the pad is constantly entrained by the liquid flowing through the pad.

100 At the rear edge, the wiping edge 22 of the squeegee 20, which is bent backwards as a result of the forward movement with the result that the wiping edge 22 is in line contact with the surface, wipes off the remaining liquid which is then sucked up through the pad 20 by the rear suction opening 11 not shown in the drawing. In this way, the surface 3 is substantially free of liquid after being treated with the cleaning head.

105 With the cleaning head shown in Figures 1 and 2 it is also possible to work in the opposite direction. In this case, the holder 16 is swivelled into the upper position and the holder 15 into the lower position so that the squeegee 19 then comes into contact with the surface while the squeegee 20 is in the raised position.

110 Figure 3 shows another preferred embodiment of a cleaning head correspondingly largely to the

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cleaning head shown in Figures 1 and 2, with corresponding parts bearing the same reference numbers. In contrast to the embodiment shown in Figures 1 and 2, this embodiment has no swivelling holders. Instead, the squeegees 19 and 20 are fastened directly to the end faces of the housing. Accordingly, there are no suction openings 12 at the front and rear ends.

In this embodiment, both squeegees 19 and 20 are always on contact with the surface 3 being cleaned. It is advantageous if the squeegees are provided with longitudinal ribs on their surfaces facing away from the head so that whichever squeegee is at the front when the cleaning head is being pushed forward rests on the surface with the longitudinal ribs as a result of the flexible bending back of the squeegee while there remains a space between the ribs through which air can be drawn in. In this way, the friction of the head is reduced when it is being moved.

On the side facing the head, however, the squeegees are smooth so that the wiping edges are in line contact with the surface 3 over the entire width of the cleaning head.

A cleaning head constituting a further preferred embodiment is shown in Figure 4. This embodiment is similar to the embodiment shown in Figure 3 with corresponding parts bearing the same reference numbers. In contrast to the embodiment shown in Figure 3, this embodiment has no suction openings 11 emerging into the pad 2. Instead the end faces of the housing are provided with suction openings 25 in similar manner to the embodiment shown in Figure 1.

In this embodiment the squeegees 19 and 20 are mounted on the housing above the suction openings 25 so that their flexible profile is in front of the suction openings 25. When the cleaning head is in operation, the front squeegee is bent against the end face of the housing and is sucked against the suction opening 25 so as to close this opening. The other squeegee is bent away from the suction opening 25 when the cleaning head is pushed forward so that this suction opening is left open. In this way, whenever there is a reversal of the direction in which the cleaning head is pushed, the front suction opening 25 is automatically closed while the rear suction opening 25 is opened. This means that the rear suction opening is always at full suction power so that, in the rear area in which the squeegee wipes the liquid from the surface, the liquid collected by the squeegee can always be sucked up with maximum efficiency.

As shown in Figure 5, the side edges of the housing can be provided with a cover 26 sealing off the side edges of the pad. The cover may, for example, be a strip of flexible material, such as rubber, or a row of bristles. This arrangement makes it possible to minimise the intake of air along the side edges of the pad. So that the cover 26 does not impede the forward movement of the cleaning head it is advantageous for the free ends of the cover to terminate at a slight distance from the surface 3. Covers 26 of the type shown in Figure 5 can be provided on all embodiments of the present invention.

Figures 6 and 7 show a cleaning head constituting a further preferred embodiment of the invention. This cleaning head is largely of identical construction to the cleaning head in Figure 3, with corresponding parts bearing the same reference numbers.

In this embodiment, holding strips 27 and 28 are mounted on the housing parallel to its end faces and are displaceable parallel to the pushing direction. Mounting is, for example, by means of two rods 29 and 30 which are guided in respective bores in the housing. The holding strips 27 and 28 are pressed against the end faces of the housing by suitable spring means. In the embodiment shown, the rods 29 and 30 are surrounded by helical springs 31 which are supported at one end of the housing and at the other end on a thrust plate 32 on the rods.

On the sides adjacent the end faces of the housing the holding strips have pointed lugs 33, as shown in Figure 6.

In this embodiment, the pad 2 is pulled around the end faces of the housing and is clamped in gaps 34 and 35 between the holding strips 27 and 28 and the corresponding end faces of the housing. To release the pad it is sufficient to remove the holding strips from the end faces against the force of the helical springs. In this way, secure fixing of the pad on the housing is provided.

Furthermore, the holding strips serve as a mounting for the squeegee 19 and 20 as shown in Figure 6. In this preferred embodiment, therefore, the holding strips fulfill a double function.

#### CLAIMS

1. A cleaning head for cleaning a flat surface, comprising an air- and liquid-permeable cleaning pad covering the head on a working face of the head, spray nozzles for feeding a cleaning liquid into a first region of the pad, and at least one extractor for removing the cleaning liquid from another region of the pad offset with respect to the first region in a pushing direction of the head, at least the rear transverse edge of the head in the pushing direction being provided with a generally vertically disposed squeegee made of a flexible material, a free edge of the squeegee being arranged to rest on the surface to be cleaned.

2. Cleaning head as claimed in claim 1, wherein the squeegee has a height which is slightly greater than the distance between the mounting of the squeegee on the head and the surface to be cleaned when the head is in use, so that the squeegee is inclined in the region of the surface to be cleaned when the head is pushed forward.

3. A cleaning head as claimed in claim 1 or 2, wherein the forward transverse edge of the head is also provided with a squeegee.

4. A cleaning head as claimed in any one of the preceding claims, wherein the head is provided with an extractor in the region of the or each squeegee at the side thereof adjacent the head.

5. A cleaning head as claimed in claim 4, wherein the extractor communicates with the region of the pad adjacent the or each squeegee.

6. A cleaning head as claimed in any one of the preceding claims, wherein the or each squeegee is fastened to a holder which is swivel-mounted on the

head, the or each holder being arranged to swivel between a first position in which the squeegee lip is in contact with the surface to be cleaned when the head is used, and a second position in which the squeegee lip is away from the surface to be cleaned when the head is in use.

7. A cleaning head as claimed in claim 6, wherein there emerges at an end face of the head extractor which is arranged to be closed by the holder when in the first position and which is opened when the holder is in the second position.

8. A cleaning head as claimed in claim 2 or in any one of claims 3 to 5 when dependent on claim 2, wherein extractors emerge at both end faces of the head and the flexible squeegees are disposed above openings of the extractors in such a way that the squeegee at the front of the head in the pushing direction is bent in front of the opening so as to close the opening whereas the squeegee at the rear of the head in the pushing direction is bent away from the opening which is thus open.

9. A cleaning head as claimed in any one of the preceding claims, wherein the side edges of the head are provided with covers for the side edges of the pad, the free ends of the covers terminating at a slight distance from the surface to be cleaned when the head is in use.

10. A cleaning head as claimed in claim 9, wherein the covers are strips of flexible material mounted on the head and projecting vertically downwards.

11. A cleaning head as claimed in claim 9, wherein the covers are bristles mounted on the head and projecting vertically downwards.

12. A cleaning head as claimed in any one of the preceding claims, wherein the or each squeegee is fastened to a or a respective strip mounted to an edge of the head and movable parallel to the pushing direction, the or each holding strip being pressed against the head by spring means so as to clamp an edge of the pad in the gap between the holding strip and the head.

13. A cleaning head as claimed in claim 12, wherein pointed locating lugs are provided on the side of the or each holding strip adjacent the pad.

14. A cleaning head substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.